

WHAT IS CLAIMED IS:

1. A decoding method of maximum a posteriori probability for calculating backward probabilities from a backward direction to a forward direction with regard
5 to receive data, calculating forward probabilities from a forward direction to a backward direction with regard to the receive data, executing decoding processing based upon the backward probabilities and the forward probabilities, and repeating this decoding processing,
10 said method comprising the steps of:
 - storing values of forward probabilities and/or backward probabilities, which have been calculated during decoding processing and prevail at calculation starting points, as initial values of forward
15 probabilities and/or backward probabilities in decoding processing to be executed next; and
 - starting calculation of forward probabilities and/or backward probabilities using the stored initial values in decoding processing executed next.
- 20 2. The method according to claim 1, wherein the decoding processing includes the steps of:
 - dividing encoded data of length N into blocks each of a prescribed length L;
 - when backward probabilities of a prescribed block
25 are calculated, starting calculation of backward probabilities from a data position backward of this block, obtaining the backward probabilities of this block and storing the backward probabilities;
 - then calculating forward probabilities and
30 executing decoding processing of each data item in a block of interest using the forward probabilities and the stored backward probabilities; and
 - thenceforth executing decoding processing of each block in similar fashion.
- 35 3. A decoding method of maximum a posteriori probability for dividing data of length N into blocks each of a prescribed length L, calculating backward probabilities from a data position, which is an initial position, backward of a block of interest when backward
40 probabilities of the block of interest are calculated, obtaining and storing the backward probabilities of the block of interest, then calculating forward probabilities, executing decoding processing of each

data item of the block of interest using the forward probabilities and the stored backward probabilities and thenceforth executing decoding processing of each block in regular order, said method comprising the steps of:

- 5 storing backward probability, which prevails at the initial position of another block and is obtained in current decoding processing of each block, as an initial value of backward probability of the other block in decoding processing to be executed next; and
- 10 starting calculation of backward probabilities of each block using the stored initial value in decoding processing executed next.

4. The method according to claim 3, wherein the initial position is a position that is one block backward of the block of interest.

5. A decoding method of maximum a posteriori probability for dividing data of length N into blocks each of a prescribed length L, calculating backward probabilities from a data position, which is an initial position, backward of a block of interest when backward probabilities of the block of interest are calculated, obtaining and storing the backward probabilities of the block of interest, then calculating forward probabilities, executing decoding processing of each data item of the block of interest using the forward probabilities and the stored backward probabilities and thenceforth executing decoding processing of each block in regular order, said method comprising the steps of:

- 25 storing backward probability, which prevails at a starting point of another block and is obtained in current decoding processing of each block, as an initial value of backward probability of the other block in decoding processing to be executed next; and
- 30 in decoding processing of each block executed next, starting calculation of backward probabilities from the starting point of said block using the stored initial value.

6. The method according to claim 5, wherein decoding by sliding window method is executed only in initial decoding processing of each block.

7. The method according to claim 5, wherein the initial position is a position that is one block backward of the block of interest.

8. The method according to claim 7, wherein a final backward probability β_{jL} of a (j+1)th block is adopted as the initial value of backward probability of a jth block in decoding processing executed next.

5 9. A decoding method of maximum a posteriori probability for calculating backward probabilities from a backward direction to a forward direction with regard to receive data, calculating forward probabilities from a forward direction to a backward direction with regard
10 to the receive data, executing decoding processing based upon the backward probabilities and the forward probabilities, and repeating this decoding processing, said method comprising the steps of:

dividing data of length N into blocks each of a
15 prescribed length L and executing, in parallel simultaneously for all blocks, processing for calculating backward probabilities from a data position, which is a backward-probability initial position, backward of each block, obtaining the backward
20 probabilities of this block and storing this backward probabilities;

when forward probabilities of each block are calculated, executing, in parallel simultaneously for all blocks, processing for calculating forward
25 probabilities from a data position, which is a forward-probability initial position, ahead of this block and obtaining the forward probabilities of this block;

executing decoding processing of data of each block in parallel using the forward probabilities of
30 each block and the stored backward probabilities of each block;

storing a backward probability, which prevails at a backward-probability initial position of another block and is obtained in current decoding processing of
35 each block, as an initial value of backward probability of the other block in decoding processing to be executed next, and storing a forward probability, which prevails at a forward-probability initial position of another block and is obtained in current decoding
40 processing of each block, as an initial value of forward probability of the other block in decoding processing to be executed next; and

starting calculation of backward probabilities and forward probabilities of each block in parallel using the stored initial values in decoding processing executed next.

5 10. The method according to claim 9, wherein the backward-probability initial position is a position one block backward of a block of interest, and the forward-probability initial position is a position one block ahead of a block of interest.

10 11. The method according to claim 10, wherein a final backward probability β_{jL} of a (j+2)th block is adopted as the initial value of backward probability of a jth block in decoding processing executed next; and

15 a final forward probability α_{jL} of a jth block is adopted as the initial value of forward probability of a (j+2)th block in decoding processing executed next.

12. A maximum a posteriori probability decoding apparatus for calculating backward probabilities from a backward direction to a forward direction with regard to receive encoding data, calculating forward probabilities from a forward direction to a backward direction with regard to the receive encoding data, executing decoding processing based upon the backward probabilities and the forward probabilities, and
20 repeating this decoding processing, said apparatus comprising:

calculation means for calculating forward probabilities and backward probabilities using encoding data;

30 means for decoding the encoding data using the forward probabilities and backward probabilities; and

means for storing values of forward probabilities and/or backward probabilities, which have been calculated during decoding processing and prevail at
35 calculation starting points, as initial values of forward probabilities and/or backward probabilities in decoding processing to be executed next;

wherein said calculation means starts calculation of forward probabilities and/or backward probabilities
40 using the stored initial values in decoding processing executed next.

13. A maximum a posteriori probability decoding apparatus for dividing encoded data of length N into blocks each of a prescribed length L, calculating backward probabilities from a data position, which is
5 an initial position, backward of a block of interest when backward probabilities of the block of interest are calculated, obtaining and storing the backward probabilities of the block of interest, then calculating forward probabilities, executing decoding
10 processing of each data item of the block of interest using the forward probabilities and the stored backward probabilities and thenceforth executing decoding processing of each block in regular order, said apparatus comprising:
- 15 calculation means for calculating forward probabilities and backward probabilities using encoding data;
means for decoding the encoding data using the forward probabilities and backward probabilities; and
20 means for storing backward probability, which prevails at the initial position of another block and is obtained in current decoding processing of each block, as an initial value of backward probability of the other block in decoding processing to be executed
25 next;
wherein said calculation means starts calculation of backward probabilities of each block using the stored initial value in decoding processing executed next.
- 30 14. A maximum a posteriori probability decoding apparatus for dividing encoded data of length N into blocks each of a prescribed length L, calculating backward probabilities from a data position, which is
35 an initial position, backward of a block of interest when backward probabilities of the block of interest are calculated, obtaining and storing the backward probabilities of the block of interest, then calculating forward probabilities, executing decoding processing of each data item of the block of interest
40 using the forward probabilities and the stored backward probabilities and thenceforth executing decoding processing of each block in regular order, said apparatus comprising:

calculation means for calculating forward probabilities and backward probabilities using encoding data;

5 means for decoding the encoding data using the forward probabilities and backward probabilities; and

means for storing a backward probability, which prevails at a starting point of another block and is obtained in current decoding processing of each block, as an initial value of backward probability of the
10 other block in decoding processing to be executed next;

wherein said calculation means starts calculation of backward probabilities from the starting point of each block using the stored initial value in decoding processing of each block executed next.

15 15. A maximum a posteriori probability decoding apparatus for calculating backward probabilities from a backward direction to a forward direction with regard to receive data, calculating forward probabilities from a forward direction to a backward direction with regard
20 to the receive data, executing decoding processing based upon the backward probabilities and the forward probabilities, and repeating this decoding processing, said apparatus comprising the following for every block when encoded data of length N has been divided into
25 blocks each of a prescribed length L:

a backward-probability calculation unit for calculating backward probabilities;

a forward-probability calculation unit for calculating forward probabilities; and

30 decoding means for decoding the data using the forward probabilities and backward probabilities;

wherein said backward-probability calculation unit for each block executes, in parallel simultaneously for all blocks, processing for calculating backward
35 probabilities from a data position, which is a backward-probability initial position, backward of each block, obtaining the backward probabilities of this block and storing this backward probabilities;

said forward-probability calculation unit for each
40 block executes, in parallel simultaneously for all blocks, processing for calculating forward probabilities from a data position, which is a forward-probability initial position, ahead of this block; and

said decoding means executes decoding processing of data of each block in simultaneously using the forward probabilities of each block and the stored backward probabilities of each block.

- 5 16. The apparatus according to claim 15, further comprising:

first storage means for storing a backward probability, which prevails at a prescribed position of another block and is obtained in decoding processing of
10 each block; and

second storage means for storing a forward probability, which prevails at a prescribed position of another block and is obtained in decoding processing of each block;

- 15 wherein said first storage means stores backward probability, which prevails at the backward-probability initial position of another block and is obtained in current decoding processing of each block, as an initial value of backward probability of the other
20 block in decoding processing to be executed next;

said second storage means stores forward probability, which prevails at the forward-probability initial position of another block and is obtained in current decoding processing of each block, as an
25 initial value of forward probability of the other block in decoding processing to be executed next; and

said backward-probability calculation unit and said forward-probability calculation unit of each block start calculation of backward probabilities and forward
30 probabilities of each block in parallel using the stored initial values in decoding processing executed next.